EPA/ESD/R08-99/149
1999

EPA Superfund
Explanation of Significant Differences:

F.E. WARREN AIR FORCE BASE
EPA ID: WY5571924179
OU 08
CHEYENNE, WY
11/13/1998

EXPLANATION OF SIGNIFICANT DIFFERENCES
OPERABLE UNIT 8, LANDFILL 5A
INTERIM REMEDIAL ACTION
F. E. WARREN AIR FORCE BASE, CHEYENNE, WYOMING

DECLARATION

Upon review of the new information that has been developed and the change that has been made to the interim remedial action alternative selected for Operable Unit 8, Landfill 5a at F. E. Warren Air Force Base, Cheyenne, Wyoming, in the November 21, 1996, ROD, the United States Air Force has determined that the interim remedy remains protective of human health and the environment; complies with federal and state requirements that are applicable or relevant and appropriate to this interim remedial action; and is cost effective. In addition, the revised interim remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

The undersigned representatives concur with this Final Explanation of Significant Differences for Operable Unit 8, Landfill 5a at F. E. Warren Air Force Base, Wyoming.

LANCE W. LORD
Lieutenant General, USAF
Vice Commander, Air Force Space Command

10/30/98
Date

MAX H. DODSON
Assistant Regional Administrator
Ecosystems Protection and Remediation
U.S. Environmental Protection Agency, Region 8

11/13/98
Date

DENNIS HEMMER
Director
Wyoming Department of Environmental Quality

11-16-98
Date

EXPLANATION OF SIGNIFICANT DIFFERENCES
F. E. WARREN AIR FORCE BASE, CHEYENNE, WYOMING
OPERABLE UNIT 8, LANDFILL 5a

1.0 INTRODUCTION

The purpose of this document is to explain the significant differences between the interim remedial action (IRA) selected in the Record of Decision (ROD), signed by the United States Air Force (USAF) and the United States Environmental Protection Agency (EPA) in November 1996, and the IRA that will be implemented at Operable Unit 8 (OU8), Landfill (LF) 5a at F. E. Warren Air Force Base (FEW) (USAF 1996).

The significant change concerns the need for an active gas venting system, which was part of the interim remedial action alternative selected in the November 1996 ROD. USAF has determined that an active gas venting system is not required for control of either nonmethane or methane soil-gas. However, a perimeter methane monitoring system will be included as part of the LF5a IRA pursuant to requirements of Wyoming Solid Waste Rules and Regulations (WSWRR), Chapter 2. If observed methane concentrations exceed regulatory limits, the Air Force will implement corrective action to mitigate potential hazards.

The lead agency for the site is USAF; EPA and WDEQ are oversight agencies. This ESD has been prepared to fulfill USAF's public participation responsibilities under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. Section 9601, *et seq*. (CERCLA, commonly known as "Superfund"), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and Title 40 of the Code of Federal Regulations (CFR) §300.435(c)(2)(i), which is part of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This ESD has been prepared in accordance with EPA guidance (EPA 1989). EPA and WDEQ have commented on the ESD, and their comments have been addressed in preparation of this ESD. This ESD addresses a significant change to a component of the IRA at LF5a. However, the type of remediation technology selected to address the IRA at LF5a has not changed (i.e., capping). Therefore, the NCP and EPA guidance cited above do not require a ROD amendment.

The ROD for the IRA at LF5a is included in the Administrative Record files. The Administrative Record that contains this Explanation of Significant Differences (ESD), as well as complete documentation pertaining to the remediation of FEW, is available for public review at the locations identified below:

Laramie County Library
2800 Central Avenue
Cheyenne, Wyoming 82001

90 SW/RM
6203 15th Cavalry Avenue
Building 367
F.E. Warren AFB, Wyoming 82005

The Administrative Record files are available at the Laramie County Library for review Monday through Thursday from 10:00 a.m. to 9:00 p.m., Friday and Saturday from 10:00 a.m. to 6:00 p.m., and Sunday from 1:00 p.m. to 5:00 p.m., and at FEW on Monday through Friday from 8:00 a.m. to 5:00 p.m. In accordance with 40 CFR Section 300.435(c)(2)(i), this ESD is made available to the public in the administrative record locations provided above and a notice of availability of the ESD has been published in major local newspapers. USAF will place in the administrative record a response to any comments received regarding the ESD. Any public comments on this ESD should be sent to the following person:

John Wright
90 SW/RM
300 Vesle Drive, Suite 600
F.E. Warren AFB WY 82005-2793
(307) 773-4147

The information presented in this ESD is organized as follows:

Section 1.0 Introduction

Section 2.0 Summary of Site History, Contamination Problems, and Selected IRA

Section 3.0 Description of Significant Differences and the Basis for Those Differences

Section 4.0 Affirmation of the Statutory Determinations

Section 5.0 References

Appendix A Revised Cost Estimate for IRA at LF5a

Appendix B Glossary of Terms

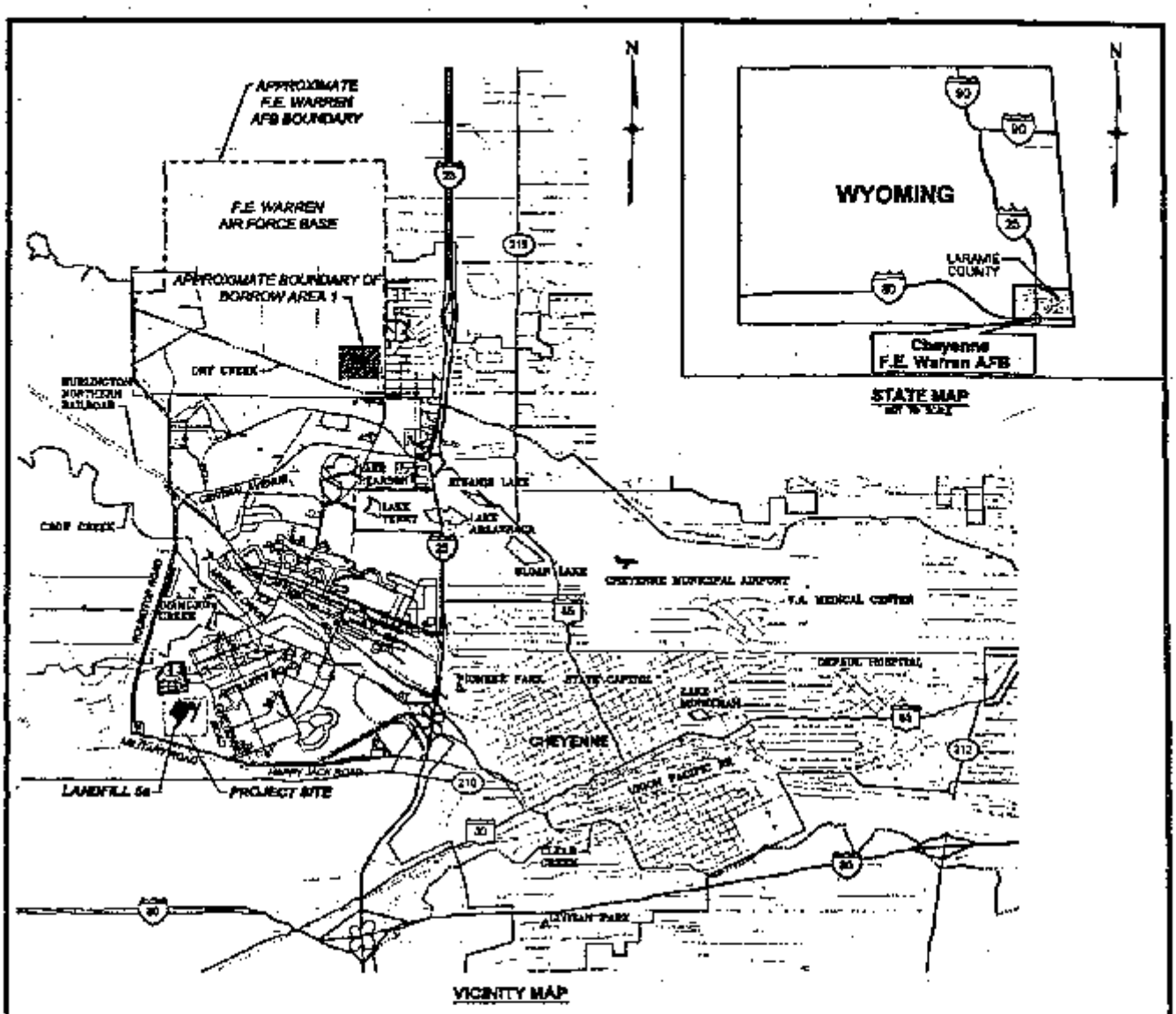
2.0 SITE HISTORY, CONTAMINATION PROBLEMS, AND SELECTED IRA

Site History

FEW occupies 5,866 acres immediately adjacent to the west side of the City of Cheyenne, Wyoming, and is bordered by agricultural land and rural or suburban residential areas (Figure 1-1). FEW contains 831 residential housing units and several unaccompanied personnel housing units (barracks), a long with the infrastructure required by FEW residents. The nearest residences to LF5a are outside of FEW, located approximately 750 feet to the south.

FEW was placed on the National Priorities List (NPL) on February 21, 1990. On September 26, 1991, USAF, EPA, and WDEQ entered into a Federal Facility Agreement to investigate and remediate the site.

OU8 consists of three subunits identified as separate landfills: LF5a, LF5b, and LF5c. LF5a is an area of approximately 16 acres located directly south of the Weapons Storage Area, north of Military Road, and west of Cheyenne Road, as shown on Figures 1-1 and 1-2. The landfill is currently covered with soil and sparse grass.



F.E. Warren Air Force Base
Cheyenne, Wyoming

APRIL 1998

Figure 1-1

Landfill 5a

VICINITY MAP

F.E. Warren Air Force Base
Cheyenne, Wyoming

APRIL 1998

Figure 1-2
Landfill 5a
SITE MAP

LF5a operated from about 1959 to 1970 as the FEW sanitary landfill and consisted of three burn pits and a series of trenches. Refuse from FEW shops and housing areas was transported daily to the landfill. FEW refuse disposed of in LF5a was reported as domestic waste and shop waste, such as solvents, waste oils, ethylene glycol, silicone oil, hydraulic fluid, waste JP-4, batteries, battery acid, expired pesticides, old paint, asbestos insulation, and incinerator ash. To reduce waste volume, the refuse was reportedly burned in the pits, removed, placed in the trenches, and covered with soil. The disposal trenches at LF5a were reported to be 10 to 15 feet deep (USAF 1995a).

Analysis of groundwater samples collected from monitor wells located in the immediate LF5a area revealed the presence of two contaminants at concentrations exceeding federal drinking water maximum contaminant levels (MCLs). These contaminants, their maximum concentrations, and respective MCLs are nitrate, 34.2 parts per million (ppm) (MCL = 10.0 ppm) and vinyl chloride, 4.4 parts per billion (ppb) (MCL = 2.0 ppb). The highest concentration of trichloroethylene (TCE) detected in the groundwater samples was 4.4 ppb; the MCL for TCE is 5.0 ppb. TCE was detected in 7 of the 34 test wells installed in the LF5a area that contained sufficient water for sampling. A high sulfate concentration of 213 ppm (MCL = 250 ppm) was detected in the same well as the highest TCE concentration (USAF 1995).

A streamlined risk assessment (SRA) was performed at LF5a and reported in the focused remedial investigation (RI) (USAF 1995a) to identify any unacceptable risks to human health from site 1 groundwater that warrant remedial action. The results of the SRA indicated that an unacceptable risk does exist and supported the need to perform an IRA at LF5a. LF5a is the source of several chemicals, the most prevalent of which is TCE, a suspected carcinogen. Vinyl chloride, a known carcinogen, presents the highest risk (USAF 1995a).

Summary of the November 1996 Record of Decision

On November 6, 1996, USAF signed the ROD for an IRA at LF5a. On November 21, 1996, EPA signed the ROD, concurring with the remedy selected by USAF. The State of Wyoming declined to sign the ROD. The November 1996 ROD Decision Summary describes the field investigation and sample results, site risks associated with LF5, and the three IRA alternatives that were evaluated during the IRA selection process. These three IRA alternatives are (1) no action, (2) compacted soil cover with a gas venting and control system, and (3) composite cover with a gas venting and control system. The "no action" alternative is required by the NCP for a baseline comparison with other alternatives. Under this alternative, USAF would take no action at the landfill to prevent exposures to contamination.

Alternative 2 is a compacted soil cover with a gas venting and control system. This alternative consists of the construction of a single-barrier, compacted-soil cover over the entire landfill surface. This cover would be designed to meet RCRA Subtitle D regulations to reduce infiltration of precipitation through landfill wastes, provide protection against direct contact with the landfill contents, and eliminate exposure to contaminant vapors and dust particulates. A typical single-barrier, compacted-soil cover consists of a compacted clay layer underneath a gravel drainage layer. A final soil layer and vegetative soil layer would be placed as a top layer to protect the cover from erosion and other weather effects. Surface water diversion and erosion and ponding prevention would be included as an integral part of the topsoil grading design. Methane gas would be controlled with an active gas venting system, where pumped-gas-vent wells are used to provide positive reduction of gas pressures. Uncontaminated cover and topsoil material would be hauled to the landfill from a borrow source. Long-term periodic monitoring of groundwater would be performed.

Alternative 3 is a composite cover with a gas venting and control system. This alternative consists of the a multiple-barrier cover that consists of a compacted clay layer covered by a synthetic liner over the landfill surface. A drainage layer then overlies the synthetic liner. A final soil layer and vegetative soil layer placed as a top layer serves to protect the cover from erosion and other weather effects. Surface water diversion and erosion and ponding prevention would be included as an integral part of the topsoil grading design. The drainage layer would collect any liquid that percolates through the topsoil. Methane gas would be controlled with an active gas venting system to reduce gas pressures. Uncontaminated cover and topsoil materials would be hauled to the landfill from a borrow source. Long-term periodic monitoring of groundwater would be performed.

In the November 1996 ROD, USAF selected Alternative 2 for an IRA at LF5a.

3.0 DESCRIPTION OF SIGNIFICANT DIFFERENCES AND THE BASIS FOR THOSE DIFFERENCES

USAF is making a significant change to a component of the selected IRA. Although the selected IRA remains a landfill cover, there is new information available that USAF has collected and considered in the remedial design process.

The significant change to the November 1996 ROD concerns the need for an active gas venting system, which was part of the interim remedial action alternative selected in the November 1996 ROD. Regulations in 40 CFR Part 60 Subpart WWW require collection and control of nonmethane soil-gas at a municipal solid waste landfill that meets certain conditions, including that the landfill has a design capacity greater than or equal to 2.5 million megagrams or 2.5 million cubic meters (3.25 million cubic yards), and the landfill has a nonmethane organic compound (NMOC) emission rate of 50 megagrams per year or more. USAF has estimated the volume of LF5a based on the lateral extent of the landfill as determined through test trenching activities and on the landfill depth as determined through the soil boring activities. This estimated volume ranges from 50,000 to 55,000 cubic meters (65,000 to 71,500 cubic yards). In accordance with 40 CFR Section 60.754(a), USAF calculated the NMOC emission rate for LF5a as 2.7 megagrams (Mg) per year based on the default values provided in the regulations. Because fhe landfill does not meet the criteria in 40 CFR 60 Subpart WWW as detailed above, USAF has determined that a gas collection and control system is not required for control of non-methane soil-gas. Additionally, because methane has not been detected in previous investigations, USAF has determined that an active gas venting system is not required at this time for control of methane. However, a perimeter methane monitoring system will be included as part of the LF5a IRA pursuant to requirements of WSWRR, Chapter 2. If observed methane concentrations exceed regulatory limits, the Air Force will implement corrective action to mitigate potential hazards.

Based on the proposed change described above, the capital cost for the IRA selected for LF5a is approximately $1.7 million. A cost estimate for the work is included as Appendix A. This estimated capital cost is significantly less than estimated capital cost for the IRA as described and selected in the November 1996 ROD ($4.3 million).

The change described above for the IRA at LF5a provides substantial cost savings, while remaining protective of human health and the environment and complying with applicable or relevant and appropriate requirements described in the November 1996 ROD. After thorough examination of the proposed change to the IRA selected for LF5a, USAF has determined that the IRA selected in the November 1996 ROD should be revised accordingly.

4.0 AFFIRMATION OF THE STATUTORY DETERMINATIONS

Considering the new information that has been evaluated and the change that has been made to the IRA selected in the November 1996 ROD, USAF believes that the interim remedy:

- Remains protective of human health and the environment
- Complies with federal and state requirements that are applicable or relevant and appropriate to this IRA
- Is more cost effective.

In addition, the revised interim remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site.

5.0 REFERENCES

Ebasco Services, Inc. (Ebasco). 1993. *Draft Records Search and Interviews Report, Operable Unit 3-Landfills 2, 3, 4, 5, 6, and 7, F. E. Warren Air Force Base.*

Engineering Science. 1985. *Installation Restoration Program, Phase I-Records Search, F. E. Warren Air Force Base, Wyoming.*

United States Air Force (USAF). 1995a. (August). *Focused Remedial Investigation for Operable Unit 8 at F. E. Warren Air Force Base, Wyoming.* Final Report.

_____. 1995b (September). *Focused Feasibility Study for Operable Unit 8: Landfill 5a at F. E. Warren Air Force Base, Wyoming.* Final Report.

_____. 1996 (November). *Record of Decision, Interim Action, Operable Unit 8: Landfill 5a, F. E. Warren Air Force Base, Wyoming.*

United States Environmental Protection Agency (EPA). 1988 (August). *CERCLA Compliance with Other Laws Manual (Interim Final).* OSWER Directive 9234. 1-01.

_____. 1989 (July). *Guidance on Preparing Superfund Decision Documents: The Proposed Plan, The Record of Decision, Explanation of Significant Differences, The Record of Decision Amendment (Interim Final).* OSWER Directive 9355.3-02. EPA/540/G-89/007.

APPENDIX A

Cost Estimate for the Interim Remedial Action for LF5a as Changed by this ESD

LF5a FINAL 100% SUMMARY REPORT

CLIENT: UNITED STATES AIR FORCE
PROJECT: LF 5a
LOCATION: F.E. WARREN AFB
JOB NO: 70.00024.22.07068
BY: G. Balis
DATE: 04/16/98

CSI DIVISIONS		DESCRIPTION	TOTAL LABOR DOLLARS	TOTAL MATERIAL DOLLARS	TOTAL EQUIPMENT DOLLARS	TOTAL SUBCONT DOLLARS	TOTAL DOLLARS
DIV.	01	General Conditions	$32,849	$17,685	$41,392	$244,813	$336,740
DIV.	02	Site Work	$103,054	$13,622	$434,759	$307,478	$858,914
DIV.	03	Concrete	$1,575	$1,063	$247	$4,309	$7,195
DIV.	05	Metals	$16	$27	$1	$0	$45
DIV.	15	Mechanical	$3,018	$2,285	$179	$260	$5,742
		CONTRACTOR DIRECT COST	$140,513	$34,683	$476,580	$556,860	$1,208,635
		OH&P **11.0%**					$132,950
		CONTRACTOR TOTAL COST					$1,341,585
		CONTINGENCY **15.0%**					$201,238
		BOND/INS. **1.5%**					$23,142
		TITLE II FEES **10.0%**					$156,597
		TOTAL LF5a COST					**$1,722,562**

File: 5a_sum_98_100%

LF5a FINAL 100% DETAIL REPORT 1998

CLIENT: UNITED STATES AIR FORCE
PROJECT: LF 5a
LOCATION: F.E. WARREN AFB
JOB NO. 70.00024.22.07068
BY: G. Blais
DATE: 04/23/98
TOTAL: $1,208.635

DESCRIPTION	QTY	UNIT	MAN HOUR UNIT	TOTAL MAN HOURS	TOTAL LABOR DOLLARS	MAT'L UNIT COST	TOTAL MAT'L COST	EQUIP. UNIT COST	TOTAL EQUIP. COST	SUB CONTRACT UNIT COST	SUB CONTRACT TOTAL COST	TOTAL COST	UNIT COST
01.01.98 Mobilization													
Cat D8	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$1,248.00	$1,248	$1,248	$1,248.00
Cat 350L Backhoe/loader	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$1,040.00	$1,040	$1,040	$1,040.00
Cast 623 Scraper	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$1,040.00	$1,040	$1,040	$1,040.00
Cat 815 Roller	2.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$208.00	$416	$416	$208.00
Street Sweeper	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$128.96	$129	$129	$128.96
Water Truck (borrow road/5a road)	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$128.96	$129	$129	$128.96
Hertz 12 CY Trucks (Includes road tax)	6.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$624.00	$3,744	$3,744	$624.00
4X4 ½ Ton Pickup	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$52.00	$52	$52	$52.00
Water Tower 10,000 Gal.	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$2,080.00	$2,080	$2,080	$2,080.00
Badging (Avg. Rate $15.00)	6.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$62.40	$374	$374	$62.40
		Subtotal		**0**	**$0**		**$0**		**$0**		**$10,252**	**$10,252**	
01.01.98 Demobilization													
Cat D8	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$1,248.00	$1,248	$1,248	$1,248.00
Cat 350L Backhoe/loader	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$1,040.00	$1,040	$1,040	$1,040.00
Cast 623 Scraper	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$1,040.00	$1,040	$1,040	$1,040.00
Cat 815 Roller	2.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$208.00	$416	$416	$208.00
Street Sweeper	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$128.96	$129	$129	$128.96
Water Truck (borrow road/5a road)	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$128.96	$129	$129	$128.96

LF5a FINAL 100% DETAIL REPORT 1998

CLIENT: UNITED STATES AIR FORCE
PROJECT: LF5a
LOCATION: F.E. WARREN AFB
JOB NO. 70.00024.22.07068
BY: G. Blais
DATE: 04/23/98
TOTAL: $1,208.635

DESCRIPTION	QTY	UNIT	MAN HOUR UNIT	TOTAL MAN HOURS	TOTAL LABOR DOLLARS	MAT'L UNIT COST	TOTAL MAT'L COST	EQUIP. UNIT COST	TOTAL EQUIP. COST	SUB CONTRACT UNIT COST	SUB CONTRACT TOTAL COST	TOTAL COST	UNIT COST
Hertz 12 CY Trucks/includes road tax)	6.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$624.00	$3,744	$3,744	$624.00
4X4 1/2 Ton Pickup	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$52.00	$52	$52	$52.00
Water Tower 10,000 Gal.	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$2,080.00	$2,080	$2,080	$2,080.00
		Subtotal		**0**	**$0**		**$0**		**$0**		**$9,878**	**$9,878**	
01.03.98 **Temporary Facilities**													
Drinking Water dispenser	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$31.20	$187	$187	$31.20
Job Site Sign	1.0	LS	0.00	0	$0	$0.00	$0	$0.00	$0	$1,040.00	$1,040	$1,040	$1,040.00
Monthly Telephone (telephone and fax line)	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$108.16	$649	$649	$108.16
Monthly Office Utilities (Electrical)	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$108.16	$649	$649	$108.16
Dumpster (Small)	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$41.60	$250	$250	$41.60
Water Tower 10,000 Gal.	1.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$4,524.00	$4,524	$4,524	$4,524.00
Port-a-Toilets (3-site, 2-borrow)	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$398.42	$2,391	$2,391	$398.42
Water fill up station for water truck 2" dia.	1.0	LS	0.00	0	$0	$0.00	$0	$0.00	$0	$832.00	$832	$832	$832.00
		Subtotal		**0**	**$0**		**$0**		**$0**		**$10,521**	**$10,521**	
01.04.98 **Contractor Planning Document****													
1- Project Eng. **1- Health & Safety** **1- Secretary (for 2 wks. Or 80 hrs. each)**	1.0	LS	0.00	0	$0	$0.00	$0	$0.00	$0	$5,824.00	$5,824	$5,824	$5,824.00
		Subtotal		**0**	**$0**		**$0**		**$0**		**$5,824**	**$5,824**	

LF5a FINAL 100% DETAIL REPORT 1998

CLIENT: UNITED STATES AIR FORCE
PROJECT: LF5a
LOCATION: F.E. WARREN AFB
JOB NO. 70.00024.22.07068
BY: G. Blais
DATE: 04/23/98
TOTAL: $1,208.635

DESCRIPTION	QTY	UNIT	MAN HOUR UNIT	TOTAL MAN HOURS	TOTAL LABOR DOLLARS	MAT'L UNIT COST	TOTAL MAT'L COST	EQUIP. UNIT COST	TOTAL EQUIP. COST	SUB CONTRACT UNIT COST	SUB CONTRACT TOTAL COST	TOTAL COST	UNIT COST
01.05.98 Project Record Drawings													
Project Record Drawing including set up time (2 Mo.)	1.0	LS	0.00	0	$0	$0.00	$0	$0.00	$0	$5,840.64	$5,841	$5,841	$5,840.64
Subtotal				**0**	**$0**		**$0**		**$0**		**$5,841**	**$5,841**	
01.06.98 Surveying													
Surveying conventional, borrow pit (Beginning)	16.0	AC	14.55	233	$3,545	$14.72	$235	$0.00	$0	$0.00	$0	$3,781	$236.29
Surveying conventional, borrow pit (End)	16.0	AC	14.55	233	$3,545	$14.72	$235	$0.00	$0	$0.00	$0	$3,781	$236.29
Survey Staking of LF5a (Re-establish elevation markers during construction)	24.0	DAYS	0.00	0	$0	$0.00	$0	$79.04	$1,897	$852.80	$20,487	$22,364	$931.84
Survey 1' contours, acres (Beginning of year)	16.0	AC	0.00	0	$0	$0.00	$0	$0.00	$0	$318.75	$5,100	$5,100	$318.75
Survey 1' contours, acres (End of year)	16.0	AC	0.00	0	$0	$0.00	$0	$0.00	$0	$159.37	$2,550	$2,550	$159.37
Survey 1' contours, acres (End of grading)	16.0	AC	0.00	0	$0	$0.00	$0	$0.00	$0	$159.37	$2,550	$2,550	$159.37
Survey 1' contours, acres (End of cover turf)	16.0	AC	0.00	0	$0	$0.00	$0	$0.00	$0	$239.05	$3,825	$3,825	$239.05
Subtotal				**465**	**$7,090**		**$471**		**$1,897**		**$34,492**	**$43,950**	
01.07.98 Testing Services/Geotechnical and Analytical													
Borrow pit testing & compaction testing (Testing trenches & soil testing	1.0	LS	0.00	0	$0	$0.00	$0	$0.00	$0	$8,320.00	$8,320	$8,320	$8,320.00

LF5a FINAL 100% DETAIL REPORT 1998

CLIENT: UNITED STATES AIR FORCE
PROJECT: LF5a
LOCATION: F.E. WARREN AFB
JOB NO. 70.00024.22.07068
BY: G. Blais
DATE: 04/23/98
TOTAL: $1,208.635

DESCRIPTION	QTY	UNIT	MAN HOUR UNIT	TOTAL MAN HOURS	TOTAL LABOR DOLLARS	MAT'L UNIT COST	TOTAL MAT'L COST	EQUIP. UNIT COST	TOTAL EQUIP. COST	SUB CONTRACT UNIT COST	SUB CONTRACT TOTAL COST	TOTAL COST	UNIT COST
Enviromental	1.0	LS	0.00	0	$0	$0.00	$0	$0.00	$0	$15,600.64	$15,600	$15,600	$15,600.00
	Subtotal			**0**	**$0**		**$0**		**$0**		**$23,920**	**$23,920**	
01.08.98 Road Maintenance													
Water truck dust/road (2-trucks for 4 mo.)	4.0	MO	346.00	1384	$19,057	$0.00	$0	$9,729.20	$38,917	$0.00	$0	$57,974	$14,493.44
	Subtotal			**1,384**	**$19,057**		**$0**		**$38,917**		**$0**	**$57,974**	
01.09.98 Field Staff													
Field Project Manager	3.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$8,333.52	$25,001	$25,001	$8,333.52
Project Engineer/QC	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$4,542.72	$27,256	$27,256	$4,542.72
Health & Safety Engineer	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$4,542.72	$27,256	$27,256	$4,542.72
Site Superintendent	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$5,551.52	$33,309	$33,309	$5,551.52
Secretary	3.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$3,028.48	$9,085	$9,085	$3,028.48
Labor Foreman	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$3,604.64	$21,628	$21,628	$3,604.64
	Subtotal			**0**	**$0**		**$0**		**$0**		**$143,536**	**$143,536**	
02.01.98 Erosion and Sedimentation Control													
Excav, util trench, W/chain trecher, 12hp, oper	5,280.0	LF	0.01	53	$891	$0.00	$0	$0.11	$579	$0.00	$0	$1,469	$0.28
walking, 4" W trench, 12" D(Lower)	1,173.0	SY	0.01	12	$140	$1.70	$1,988	$0.00	$0	$0.00	$0	$2,128	$1.81
Erosion control, polypropylene mesh, stapled,													
6.5 oz./s.y (5,280' x 2' / 9)	6.0	MO	0.00	0	$0	$0.00	$0	$0.00	$0	$91.52	$549	$549	$91.52
Erosion control maintenanance on mesh fence													

LF5a FINAL 100% DETAIL REPORT 1998

CLIENT: UNITED STATES AIR FORCE
PROJECT: LF5a
LOCATION: F.E. WARREN AFB
JOB NO. 70.00024.22.07068
BY: G. Blais
DATE: 04/23/98
TOTAL: $1,208.635

DESCRIPTION	QTY	UNIT	MAN HOUR UNIT	TOTAL MAN HOURS	TOTAL LABOR DOLLARS	MAT'L UNIT COST	TOTAL MAT'L COST	EQUIP. UNIT COST	TOTAL EQUIP. COST	SUB CONTRACT UNIT COST	SUB CONTRACT TOTAL COST	TOTAL COST	UNIT COST
Hay bales in channels	1,000.0	EA	0.02	20	$238	$1.50	$1,498	$0.00	$0	$0.00	$0	$1,736	$1.74
		Subtotal		**85**	**$1,268**		**$3,486**		**$579**		**$549**	**$5,882**	
02.02.98 Site Clearing													
D-8 Dozer Equipment and Operator (5 days)	40.0	HRS	40.00	1600	$726	$0.00	$0	$118.96	$4,758	$0.00	$0	$5,484	$137.09
Spotter (common laborer)	40.0	HRS	40.00	1600	$477	$0.00	$0	$0.00	$0	$0.00	$0	$477	$11.93
		Subtotal		**3,200**	**$1,203**		**$0**		**$4,758**		**$0**	**$5,961**	
02.03.98 Topsoil Stripping and Stockpiling													
Removal of 6" of soil at borrow pit (16,000 CY)	16,000.0	CY	173.00	2768000	$3,112	$0.00	$0	$1.76	$28,122	$0.00	$0	$31,233	$1.95
		Subtotal		**2,768,000**	**$3,112**		**$0**		**$28,122**		**$0**	**$31,233**	
02.04.98 Access Road Construction													
Access road improvements from pavement to site area (1500 lf)	1,111.0	CY	0.18	197	$3,501	$6.62	$7,360	$11.22	$12,467	$0.00	$0	$23,329	$21.00
New LF5a access road (1600lf)	356.0	CY	0.18	63	$1,122	$6.62	$2,358	$11.22	$3,395	$0.00	$0	$7,475	$21.00
Compacting road	1.0	LS	10.0	10	$169	$0.00	$0	$421.20	$421	$0.00	$0	$590	$589.89
Compacting fill around CMP pipe	1.0	LS	4.60	5	$78	$0.00	$0	$193.75	$194	$0.00	$0	$271	$271.34
Backfill, tamped for CMP pipe	6.0	CY	0.07	0	$6	$0.00	$0	$4.66	$28	$0.00	$0	$34	$5.66
Excavating, backhoe, hyd,crawler	147.0	CY	0.03	4	$69	$0.00	$0	$0.96	$142	$0.00	$0	$211	$1.44

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DATE: 04/23/98
TOTAL: $1,208.635

DESCRIPTION	QTY	UNIT	MAN HOUR UNIT	TOTAL MAN HOURS	TOTAL LABOR DOLLARS	MAT'L UNIT COST	TOTAL MAT'L COST	EQUIP. UNIT COST	TOTAL EQUIP. COST	SUB CONTRACT UNIT COST	SUB CONTRACT TOTAL COST	TOTAL COST	UNIT COST
Piping, CMP galvanized, 18" diameter, 16 Ga	180.0	LF	0.14	25	$338	$13.62	$2,452	$0.54	$98	$0.00	$0	$2,888	$16.05
		Subtotal		**303**	**$5,283**		**$12,171**		**$17,345**		**$0**	**$34,798**	
02.05.98 Subgrade Preparation													
Spotter (common laborer)	1.0	WK	40.00	40	$477	$0.00	$0	$0.00	$0	$0.00	$0	$477	$477.36
815 Cat compactor w/bladet and Operator (16 AC)	1.0	WK	80.00	80	$1,451	$0.00	$0	$6,697.60	$6,698	$0.00	$0	$8,148	$8,148.40
		Subtotal		**120**	**$1,928**		**$0**		**$6,698**		**$0**	**$8,626**	
02.06.98 Monitoring Well Extension													
Extention CMP, 12" diam, 16 ga.	20.0	LF	0.10	2	$27	$5.41	$108	$0.39	$8	$0.00	$0	$143	$7.14
Pea gravel	2.0	CY	0.86	2	$20	$57.20	$114	$0.00	$0	$0.00	$0	$135	$87.39
Forms in place, 5' dia. thick foundation, 1 use	7.0	SFCA	0.17	1	$29	$1.61	$11	$0.15	$1	$0.00	$0	$41	$5.87
Cement bentonite grout	0.8	CY	16.72	13	$324	$205.92	$154	$56.29	$42	$0.00	$0	$521	$694.38
Concrete in place, slab on grade, not including finish, 6" thick	2.5	CY	1.28	3	$77	$69.68	$174	$0.57	$1	$0.00	$0	$252	$100.93
Placing concrete	2.5	CY	1.42	4	$52	$0.00	$0	$15.83	$40	$0.00	$0	$92	$36.63
Finishing pad 5' dia., broom finish	110.0	SF	0.01	1	$34	$0.00	$0	$0.06	$7	$0.00	$0	$41	$0.37
Removal of wooden forms	35.0	SFCA	0.00	0	$0	$0.00	$0	$0.00	$0	$1.71	$60	$60	$1.71
2"x2" angle iron bracing, 4 braces per each well	30.0	LB	0.02	1	$16	$0.89	$27	$0.05	$1	$0.00	$0	$45	$1.49

LF5a FINAL 100% DETAIL REPORT 1998

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JOB NO. 70.00024.22.07068
BY: G. Blais
DATE: 04/23/98
TOTAL: $1,208.635

DESCRIPTION	QTY	UNIT	MAN HOUR UNIT	TOTAL MAN HOURS	TOTAL LABOR DOLLARS	MAT'L UNIT COST	TOTAL MAT'L COST	EQUIP. UNIT COST	TOTAL EQUIP. COST	SUB CONTRACT UNIT COST	SUB CONTRACT TOTAL COST	TOTAL COST	UNIT COST
Cut the existing protective casing and well casing	5.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$52.00	$260	$260	$52.00
Pipe, PVC, hi imp/press, cpig 10' OC, hgrs 3 per 10', sched 40, 2" dia	25.0	LF	0.27	7	$195	$2.49	$62	$0.00	$0	$0.00	$0	$257	$10.27
Pipe, PVC, hi imp. Sched 40, 4"dia	15.0	LF	0.33	5	$144	$5.25	$79	$0.00	$0	$0.00	$0	$222	$14.82
2" Cap PVC	3.0	EA	0.73	2	$63	$3.24	$10	$0.00	$0	$0.00	$0	$72	$24.13
4" Cap PVC	2.0	EA	1.33	3	$77	$13.00	$26	$0.00	$0	$0.00	$0	$103	$51.31
2" PVC cpig.	3.0	EA	0.57	2	$49	$0.46	$1	$0.00	$0	$0.00	$0	$51	$16.88
4" PVC cpig.	2.0	EA	0.94	2	$54	$2.09	$4	$0.00	$0	$0.00	$0	$58	$29.13
Pipe, steel, sch. 40, A-53.gr A/B, ERW, welded W/Lid., 6" dia	30.0	LF	0.65	19	$580	$16.69	$501	$1.42	$43	$0.00	$0	$1,124	$37.46
		Subtotal		**66**	**$1,740**		**$1,272**		**$143**		**$320**	**$3,475**	
02.07.98 **Manhole Extension**													
Backfill common dirt	5.0	CY	0.01	0	$1	$0.00	$0	$0.30	$1	$0.00	$0	$2	$0.49
Excavating, hydraulic excavator, truck mtd, ½ c.y = 30 C.Y./hr	5.0	CY	0.07	0	$6	$0.00	$0	$2.64	$13	$0.00	$0	$19	$3.81
Manhole/mhs,frs&covs,rsd for paving 1-1/4" to 2" hi,30" to 36" dia.	1.0	EA	2.67	3	$32	$142.48	$142	$0.00	$0	$0.00	$0	$174	$174.21
		Subtotal		**3**	**$39**		**$142**		**$16**		**$0**	**$196**	
02.08.98 **On-Site Grading Fill**													
Equipment and Operator (Use D-8 or 815 from borrow pit)	2,700.0	CY	0.02	54	$534	$0.00	$0	$1.06	$2,864	$0.00	$0	$3,398	$1.26

LF5a FINAL 100% DETAIL REPORT 1998

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DATE: 04/23/98
TOTAL: $1,208.635

DESCRIPTION	QTY	UNIT	MAN HOUR UNIT	TOTAL MAN HOURS	TOTAL LABOR DOLLARS	MAT'L UNIT COST	TOTAL MAT'L COST	EQUIP. UNIT COST	TOTAL EQUIP. COST	SUB CONTRACT UNIT COST	SUB CONTRACT TOTAL COST	TOTAL COST	UNIT COST
Subtotal				**54**	**$534**		**$0**		**$2,864**		**$0**	**$3,398**	
02.09.98 Imported Grading Fill													
350L at borrow pit	25,000.0	CY	0.01	150	$2,730	$0.00	$0	$0.56	$14,040	$0.00	$0	$16,770	$0.67
Hauling of fill from borrow pit 6 dump trucks @ 12 cy capacity	25,000.0	CY	0.04	900	$12,922	$0.00	$0	$1.92	$48,100	$0.00	$0	$61,022	$2.44
Haul leveling 2-815 cat compactors	25,000.0	CY	0.01	300	$5,070	$0.00	$0	$0.30	$7,540	$0.00	$0	$12,610	$0.50
Subtotal				**1,350**	**$20,722**		**$0**		**$69,680**		**$0**	**$90,402**	
02.10.98 Drainage Construction Including Riprap and Geotextile													
Erosion Control Blankets	27,500.0	SY	0.00	0	$5,434	$0.50	$13,728	$0.00	$0	$0.00	$0	$19,162	$0.70
Geotextile (95 x 20)	1,750.0	SF	0.00	0	$0	$0.00	$0	$0.00	$0	$0.52	$910	$910	$0.52
Rip-rap, machine placed	65.0	CY	0.26	17	$294	$10.56	$686	$7.80	$507	$0.00	$0	$1,487	$22.88
Subtotal				**17**	**$5,728**		**$14,414**		**$507**		**$910**	**$21,559**	
02.11.98 Compacted Cover, 24" Thick													
Dump Truck and Drive	49,000.0	CY	0.04	1872	$26,805	$0.00	$0	$2.05	$100,391	$0.00	$0	$127,196	$2.60
350L Blackhoe/loader	49,000.0	CY	0.01	312	$5,657	$0.00	$0	$0.82	$40,258	$0.00	$0	$45,915	$0.94
815 Compactor w/blade	49,000.0	CY	0.01	624	$10,528	$0.00	$0	$0.32	$15,798	$0.00	$0	$26,326	$0.54
D-8 Dozer	49,000.0	CY	0.01	312	$5,657	$0.00	$0	$1.47	$72,032	$0.00	$0	$77,689	$1.59
Spotter (Common laborer)	49,000.0	CY	0.01	312	$3,720	$0.00	$0	$0.00	$0	$0.00	$0	$3,720	$0.08
Subtotal				**3,432**	**$52,367**		**$0**		**$228,479**		**$0**	**$280,846**	

LF5a FINAL 100% DETAIL REPORT 1998

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DATE: 04/23/98
TOTAL: $1,208.635

	DESCRIPTION	QTY	UNIT	MAN HOUR UNIT	TOTAL MAN HOURS	TOTAL LABOR DOLLARS	MAT'L UNIT COST	TOTAL MAT'L COST	EQUIP. UNIT COST	TOTAL EQUIP. COST	SUB CONTRACT UNIT COST	SUB CONTRACT TOTAL COST	TOTAL COST	UNIT COST
02.12.98	**Topsoil 6" *N*egetative Layer Fill, 6" Thick**													
Dump Truck and Driver		15,000.0	CY	0.04	624	$8,936	$0.00	$0	$2.24	$33,540	$0.00	$0	$42,476	$2.83
350L Backhoe/loader		15,000.0	CY	0.01	104	$1,886	$0.00	$0	$0.89	$13,416	$0.00	$0	$15,302	$1.02
815 Compactor w/blade		15,000.0	CY	0.01	208	$3,508	$0.00	$0	$0.35	$5,304	$0.00	$0	$8,812	$0.59
D-8 Dozer		15,000.0	CY	0.01	104	$1,886	$0.00	$0	$1.60	$24,024	$0.00	$0	$25,910	$1.73
Spotter (Common laborer)		15,000.0	CY	0.01	104	$1,240	$0.00	$0	$0.00	$0	$0.00	$0	$1,240	$0.08
			Subtotal		**1,144**	**$17,456**		**$0**		**$76,284**		**$0**	**$93,740**	
02.13.98	**Turf, Seeding,Fertilizer, Mulching**													
Acres to be turfed		35.0	AC	0.00	0	$0	$0.00	$0	$0.00	$0	$8,245.04	$288,576	$288,576	$8,245.04
			Subtotal		**0**	**$0**		**$0**		**$0**		**$288,576**	**$288,576**	
02.14.98	**Methane Monitoring**													
Probes														
Pea gravel packing		7.0	CY	0.86	6	$71	$57.20	$400	$0.00	$0	$0.00	$0	$472	$67.40
Forms in place, 5' dia. thick foundation, 1 use		146.0	SFCA	0.17	24	$600	$1.61	$235	$0.15	$21	$0.00	$0	$857	$5.87
Concrete in place, slab on grade, not including finish, 6" thick		7.0	CY	1.28	9	$215	$69.68	$488	$0.57	$4	$0.00	$0	$707	$100.93
Placing concrete		7.0	CY	1.42	10	$146	$0.00	$0	$15.83	$111	$0.00	$0	$258	$36.63
Finishing pad 5' dia., broom finish		320.0	SF	0.01	4	$99	$0.00	$0	$0.06	$20	$0.00	$0	$119	$0.37
Removal of wooden forms		146.0	SFCA	0.00	0	$0	$0.00	$0	$0.00	$0	$1.71	$249	$249	$1.71
Mobilization/Demobilization		1.0	LS	0.00	0	$0	$0.00	$0	$0.00	$0	$500.00	$500	$500	$500.00

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Drill Rig	2.0	DAY	0.00	0	$0	$0.00	$0	$0.00	$0	$1,350.00	$2,700	$2,700	$1,350.00
1" Well Material	16.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$50.00	$800	$800	$50.00
Protective casing pipe, steel, Sch. 40, A-53,gr A/B, ERW, welded W/Lid., 6" dia	96.0	LF	0.65	62	$1,857	$16.69	$1,602	$1.42	$137	$0.00	$0	$3,596	$37.45
		Subtotal		**115**	**$2,988**		**$2,726**		**$293**		**$4,249**	**$10,256**	
02.15.98 **Fence, Gates, and Signs**													
Fencing	5,000.0	LF	0.00	0	$0	$0.00	$0	$0.00	$0	$3.32	$16,588	$16,588	$3.32
Gates and steel post	3.0	EA	0.00	0	$0	$0.00	$0	$0.00	$0	$468.00	$1,404	$1,404	$468.00
		Subtotal		**0**	**$0**		**$0**		**$0**		**$17,992**	**$17,992**	
		TOTAL		**2,779,738**	**$140,513**		**$34,683**		**$476,580**		**$556,860**	**$1,208,635**	

APPENDIX B

Glossary of Terms

GLOSSARY OF TERMS

Administrative Record: The files containing the documents used in selecting a remedy for a Superfund site.

ARARs: Applicable or relevant and appropriate requirements. These requirements refer to the federal and state requirements that a selected remedy will attain.

Carcinogen: A cancer-causing substance.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund): A law passed in 1980 that establishes a program to identify abandoned hazardous substance sites, ensure that they are cleaned up, evaluate damages to natural resources, and create claims procedures for parties who cleaned up the sites. The Superfund Amendments and Reauthorization Act (SARA) was enacted in 1986 to expand and modify CERCLA.

Explanation of Significant Differences (ESD): A document that is prepared to inform the EPA, State, and public about significant changes to a component of a selected remedy that was identified in the Record of Decision. This document presents the changes and explains why the changes are necessary.

Groundwater: Water found beneath the earth's surface that supplies wells and springs.

Lead Agency: The lead agency has the primary responsibility for coordinating a response action. Either EPA, a state environmental agency, or another federal agency, such as the Department of Defense for cases of hazardous waste sites on military bases, can serve as the lead agency. The lead agency for FEW is USAF.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP) : The regulations that specify how Superfund sites are addressed.

National Priorities List (NPL): EPA's list of top-priority hazardous waste sites that are eligible for investigation and cleanup under the federal Superfund program.

Operable Unit (OU): A term used to describe a certain portion of a Superfund site. An OU may be established based on a particular type of contamination, contaminated earth material (such as water and soil), source of contaminants, or geographic location.

Record of Decision: A public document that presents and explains the cleanup alternatives that may be used at a Superfund site. The ROD is based on information from the remedial investigation, feasibility study, public comments, community concerns, and other sources of research material.

Remediation: Cleanup or control of hazardous substances at a Superfund site.

Resource Conservation and Recovery Act (RCRA): A law enacted in 1984 that governs management of solid wastes.